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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

LEVITAN, DMITRY

ART UNIT

PAPER NUMBER

2616

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/713,562	Applicant(s) CHADHA ET AL.	
	Examiner Dmitry Levitan	Art Unit 2616	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 November 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-56 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 21-26, 29-32, 44-48, 50-52, 55 and 56 is/are allowed.
- 6) ☒ Claim(s) 1-7, 9, 13-16, 19, 20, 27, 28, 33-38, 42, 43, 49, 53 and 54 is/are rejected.
- 7) ☒ Claim(s) 8, 10-12, 17, 18 and 39-41 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 14 November 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

Drawings

1. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description: all references of Fig. 4 are not mentioned in the description, as the description on pages 9 and 10 uses references, which are not shown on Fig. 4. Corrected drawing sheets in compliance with 37 CFR 1.121(d), or amendment to the specification to add the reference character(s) in the description in compliance with 37 CFR 1.121(b) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

2. Claim 27 is objected to because of the following informalities: it seems that claim 27 should depend on claim 21, because claim 19, identical to claim 27, already depends on claim 1. Appropriate correction is required.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

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The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claims 20, 28, 33, 43, 49 and 53 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

The specification does not provide sufficient details to enable a skilled in the art to make and use the invention because it does not adequately describe the following:

Regarding claims 20, 28, 33, 43, 49 and 53, how to combine IEEE 802.11a, IEEE 802.11g and HYPERLAN/2 standards.

The specification does not provide enough details about the structure and operation of the elements associated with the above identified claimed features to enable one skilled in the art to make and use the invention without undue experimentation.

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 2, 5, 9, 13, 14, 20, 28, 33, 35, 43, 49 and 53 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 2, 13 and 35 recite the limitation "the negative value" in line 3. There is insufficient antecedent basis for these limitations in the claims. In addition, it is unclear what "negative value of the accumulated phase offset" means in the context of the claims as no reference for the direction, positive or negative, of the offset is identified.

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Claim 5 recites the limitation "the phase gradient" in line 2. There is insufficient antecedent basis for this limitation in the claim.

Claim 9 recites the limitation "the magnitude" in line 3. There is insufficient antecedent basis for this limitation in the claim.

Claim 14 recites the limitation "the initial step" in line 1. There is insufficient antecedent basis for this limitation in the claim. In addition, it is unclear what "selectively rotating" means in the context of the claims as it is unclear what is selected and what is not for the rotation.

Claims 20, 28, 33, 43, 49 and 53 recite the limitation "the group" in line 2. There is insufficient antecedent basis for these limitations in the claims.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 1-4, 7, 13, 19, 27, 34-36, 42 and 54 are rejected under 35 U.S.C. 103(a) as being unpatentable over Imamura (US 6,801,586) in view of Bingham (US 5,206,886).

9. Regarding claims 1, 34 and 54, Imamura substantially teaches the limitations of claims:

A method, an apparatus and a system for reducing phase error in a pilot-based, frequency-division-multiplexing (FDM) receiver configured to receive FDM symbols from a remote source, each symbol including a data sub-carrier and a plurality of pilot sub-carriers

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(OFDM receiver, shown on Fig. 3 and disclosed on 3:17-6:26, wherein the received signal is shown on Fig. 6 and comprise pilot symbols), comprising:

compensating the plurality of pilot sub-carriers by an accumulated phase offset, each pilot sub-carrier residing at a respective different frequency (performing propagation path estimation/compensation by circuit 104, shown on Fig. 3 and 3:49-55, wherein the propagation path distortion is estimated according to the pilot symbols, as shown on Fig. 1, 2 and 7, and disclosed on 1:21-52 and 5:60-6:26);

calculating a residual phase offset for each of the plurality of corrected pilot sub-carriers (performing error correction by circuit 105, shown on Fig. 3 and disclosed on 3:53-57, wherein the error correction is estimated according to the information symbols, as shown on Fig. 1, 2 and 7, and disclosed on 1:21-52 and 5:60-6:26),

determining residual phase offset for the calculated residual phase offsets of the plurality of corrected pilot sub-carriers (performing error correction by circuit 105, as described above);

updating the accumulated phase offset using the residual phase offset (performing both corrections, as shown on Fig. 3 and 7, and described above); and

correcting the data sub-carrier using the updated accumulated phase offset (performing error compensation to the information symbols, as shown on Fig. 7).

Imamura does not teach determining a mean residual phase offset for the calculated residual phase offsets of the plurality of pilot sub-carriers and rotation as a form of the symbol correction/compensation.

Bingham teaches determining a mean residual phase offset for the calculated residual phase offsets of the plurality of rotated pilot sub-carriers (calculating a Least Mean Squared Error for pilot symbols 4:65-5:50 and performing a rotation correction operation 7:34-50).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to add determining a mean residual phase offset for the calculated residual phase offsets of the plurality of rotated pilot sub-carriers of Bingham to the system of Imamura to improve the system efficiency by utilizing a LMS operation with pilot symbols to avoid using individual operations with each pilot offset.

In addition, regarding claim 34, Imamura teaches an accumulator storing an accumulated phase offset, as Propagated path estimated value update circuit 204, shown on Fig. 4, a first and a second multipliers 202 and 203, connected to the accumulator 204, operating as described above, and a processor, inherent to the system, to perform the operation, because using a processor is essential to the system.

10. Regarding claims 19, 27, and 42, Imamura teaches the symbols in the system as OFDM symbols 1:5-45.

11. Regarding claims 2, 13 and 35 (as best understood), Imamura inherently teaches applying negative and positive coefficients in the multiplication process to adjust the phase of the received symbols in both directions as needed to compensate for the received offset 4:43-63.

12. Regarding claims 3, 4, 7 and 36, Imamura substantially teaches the limitations of claims 4 and 7 (see rejection of the parent claim for details).

Imamura does not teach calculating arctangent (claim 3) and fitting a curve technique to determine the pilots phase offset (claim 4) and use of LMS operation (claim 7).

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Bingham teaches calculating arctangent 5:24-28, and fitting a curve technique to determine the pilots phase offset, as shown on Fig. 5 and disclosed on 6:49-55 and using LMS operation 5:37-42).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to add calculating arctangent, fitting a curve technique to determine the pilots phase offset and use of LMS operation of Bingham to the system of Imamura to utilize well known solutions for calculating phase differences in OFDMA system.

13. Claims 5, 6, 37 and 38 are rejected (as best understood) under 35 U.S.C. 103(a) as being unpatentable over Imamura in view of Bingham in view of Kolze (US 7,184,506).

Imamura in view of Bingham substantially teaches the limitations of claims (see the parent claims rejection above), including use of LMS operation (Bingham 5:37-42).

Imamura in view of Bingham does not teach using a slope indicative of the phase gradient versus frequency and utilizing zero-frequency crossing for indicating phase offset.

Kolze teaches using curve fitting, to indicate the phase dependency again frequency 11:30-36, shown on Fig. 10, including a ramp to characterize the phase dependency 12:1-34 and zero mean compensation 11:55-65.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to add using IEEE 802.11a standard of Kolze to the system of Imamura in view of Bingham to utilize well known solutions for calculating phase differences in OFDMA system.

14. Claims 20, 28 and 43 are rejected (as best understood) under 35 U.S.C. 103(a) as being unpatentable over Imamura in view of Bingham in view of Admitted Prior Art (current application, [0004]).

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Imamura in view of Bingham substantially teaches the limitations of claims (see the parent claims rejection above).

Imamura in view of Bingham does not teach using IEEE 802.11a standard.

Admitted Prior Art teaches using IEEE 802.11a standard, as disclosed on [0004].

It would have been obvious to one of ordinary skill in the art at the time the invention was made to add using IEEE 802.11a standard of Admitted Prior Art to the system of Imamura in view of Bingham to improve the system compatibility with existing standards.

15. Claims 14-16 are rejected (as best understood) under 35 U.S.C. 103(a) as being unpatentable over Imamura in view of Bingham in view of Rosenlof (US 6,546,056).

Imamura in view of Bingham substantially teaches the limitations of claims (see the parent claims rejection above).

Regarding claims 14 and 15 Imamura in view of Bingham does not teach rotating sub-carriers into predetermined region corresponding to +1 decision region of BPSK.

Rosenlof teaches using rotating the received carriers to compensate their phase offset into the midpoint of their sampling area to restore the initial phase values 6:53-7:28, inherently including +1 value for BPSK constellation, because restoring +1 decision area is essential for the restoration of the constellation.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to add using rotating sub-carriers into predetermined region corresponding to +1 decision region of BPSK of Rosenlof to the system of Imamura in view of Bingham to improve the system compensation for the BPSK constellation offset.

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Regarding claim 16, Imamura in view of Bingham does not teach using detecting and compensating sampling timing errors.

Rosenlof teaches using detecting and compensating sampling timing errors (detecting and compensating sampling offsets 6:21-43).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to add using detecting and compensating sampling timing errors of Rosenlof to the system of Imamura in view of Bingham to improve the system operation with sampling offsets to increase the quality of the reception.

Allowable Subject Matter

16. Claims 21-26, 29-32, 44-48, 50-52, 55 and 56 are allowed.

17. Claims 8, 10-12, 18 and 39-41 objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

18. Claims 9 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dmitry Levitan whose telephone number is (571) 272-3093. The examiner can normally be reached on 8:30 to 4:30.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Lynn Feild can be reached on (571) 272-2092. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

A handwritten signature in black ink, appearing to read 'DL' followed by a stylized name.

Dmitry Levitan
Primary Examiner
Art Unit 2616

**DMITRY LEVITAN
PRIMARY EXAMINER**